Not all chest pain is MI: Pericarditis and Myocarditis

Mary A. Stahl, RN, MSN
CNS-BC, CCNS-CMC, CCRN
Clinical Practice Specialist

Meet KG

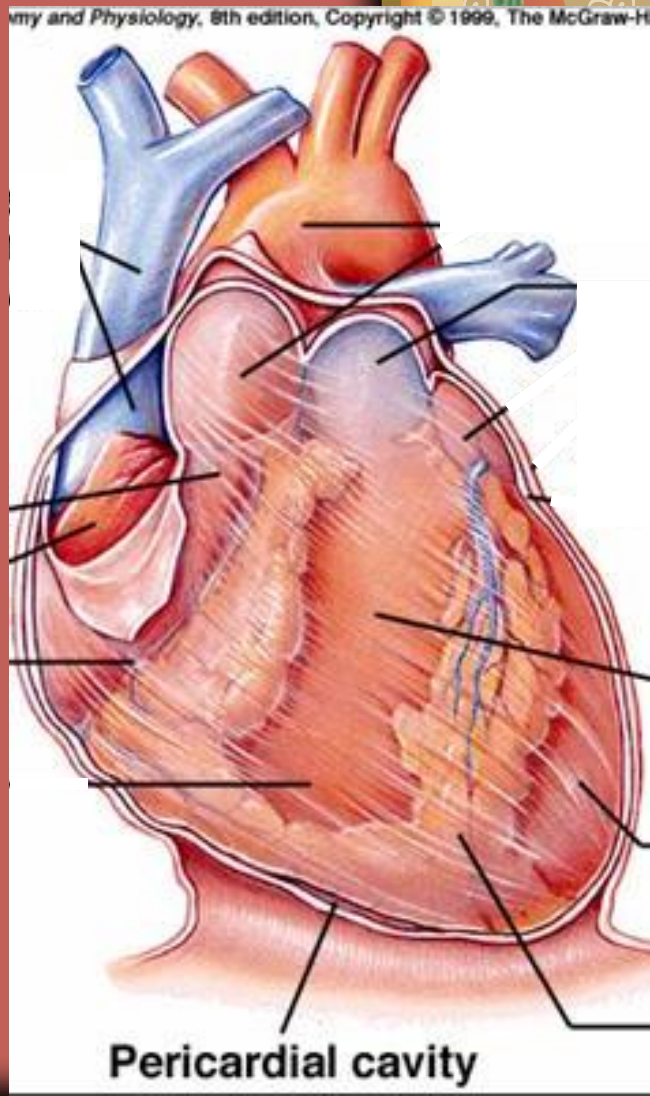
- 42 year old man
- Presents with complaint of chest pain
- Pain has increased over last 2 hours
- Now rates it as 7/10
- BP 92/50
- Sinus Tachycardia, rate 116

What might this be?

What additional information will help make the diagnosis?

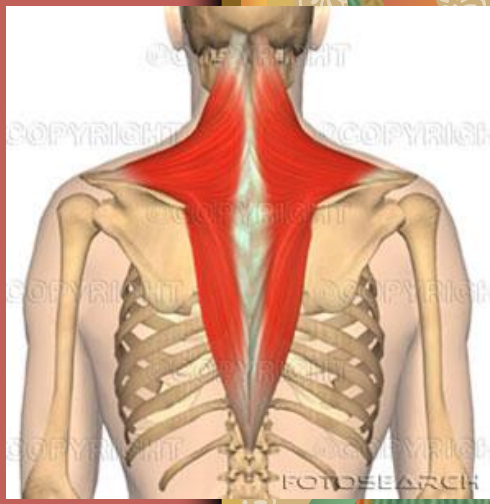
Pericardium

- Flexible double-walled membrane
- Parietal pericardium
- Visceral pericardium (epicardium)
- Potential space between contains 15-35 mL pericardial fluid
  - Ultrafiltrate of blood plasma & cardiac lymph
  - Lubricant to reduce interlayer friction



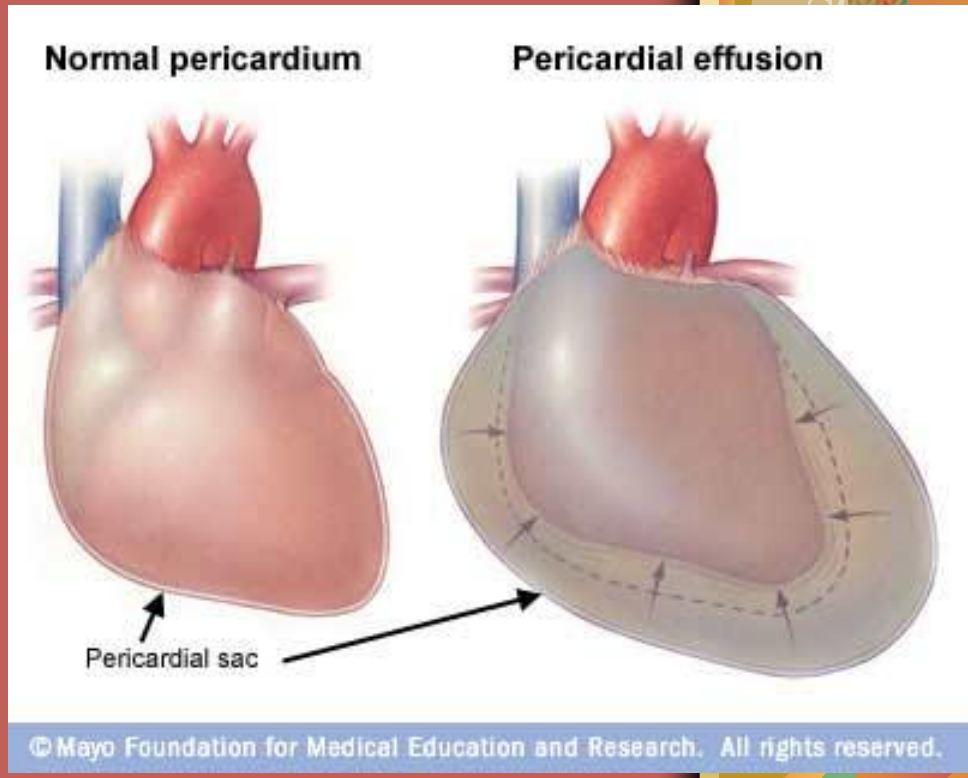
Pericarditis – Pain is most common symptom

- Sharp, stabbing, pleuritic, or aching like MI
- Worse with lying down, improves with sitting up and leaning forward
- Usually retrosternal, may radiate to shoulder, neck, jaw
- May complain of trapezius ridge pain, usually on left (mediated by phrenic nerve)
- Other symptoms may help indicate etiology (fever, myalgias)



Pericarditis – Physical exam

- Friction rub
- Hemodynamic change if large effusion
  - Tachycardia
  - Tachypnea
  - Pulsus paradoxus
  - Beck triad indicates tamponade
    - JVD, hypotension, muffled heart sounds

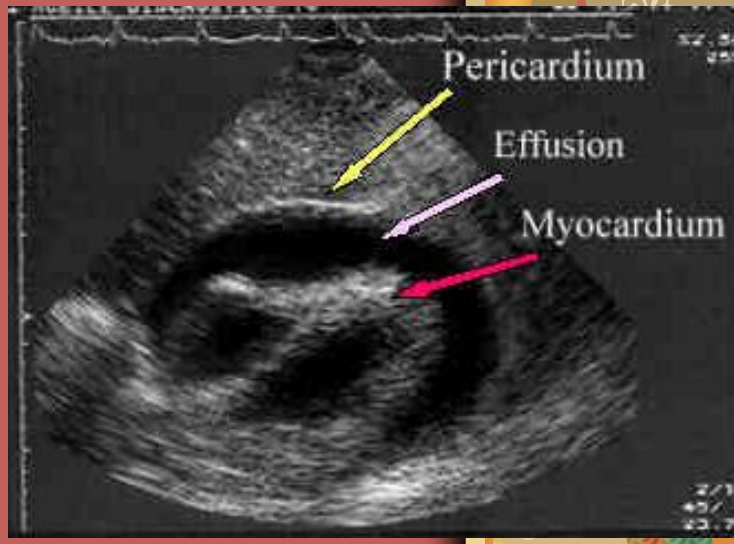


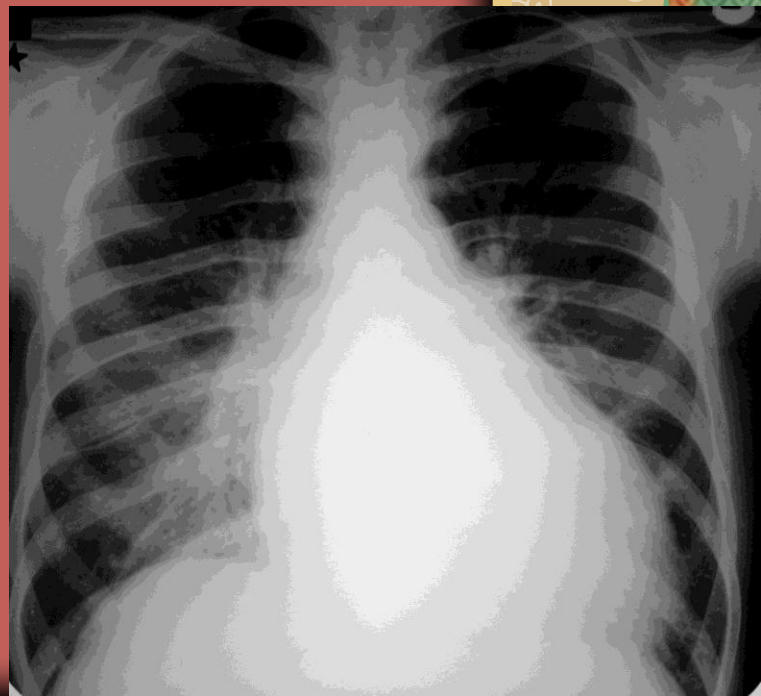
Pericarditis - Etiologies

- Idiopathic
- Infectious
  - Viral (21%)
  - Bacterial
  - TB
- Radiation
- Neoplastic (35%)
- Trauma
- Metabolic
- Cardiac
  - Dressler's
  - Aortic dissection
- Autoimmune (23%)
  - Lupus
  - Vasculitis
  - Rheumatoid arthritis
  - Sarcoidosis
- Drug induced lupus

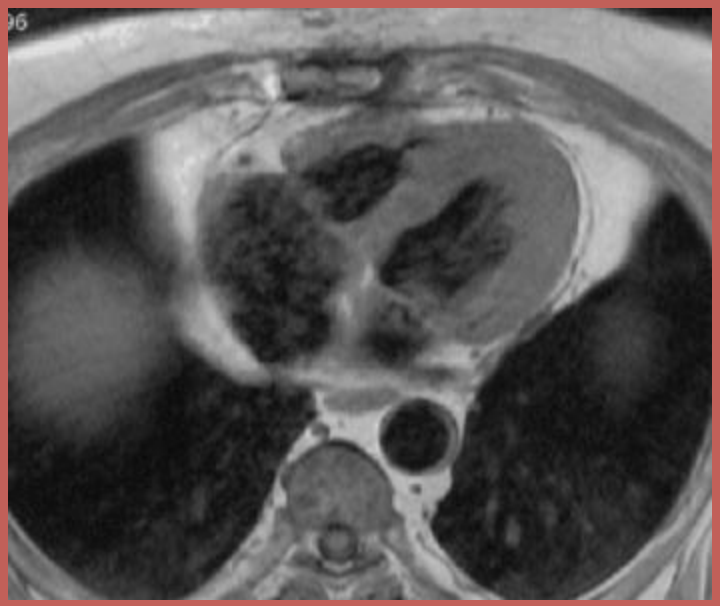
Pericarditis - Evaluation

- History – seek cause
- EKG
- Echo
  - difficult to differentiate small effusion and pericardial thickening
  - R/O large effusion/tamponade
- CXR
  - boot shaped silhouette if large effusion
- Labs
  - CBC, BMP, sed rate, cardiac enzymes

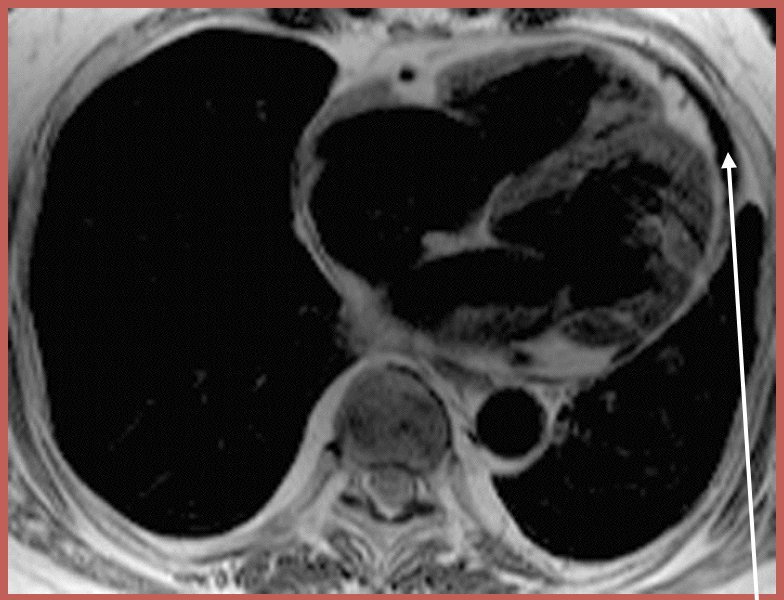




Other Imaging – Cardiac MRI



Normal

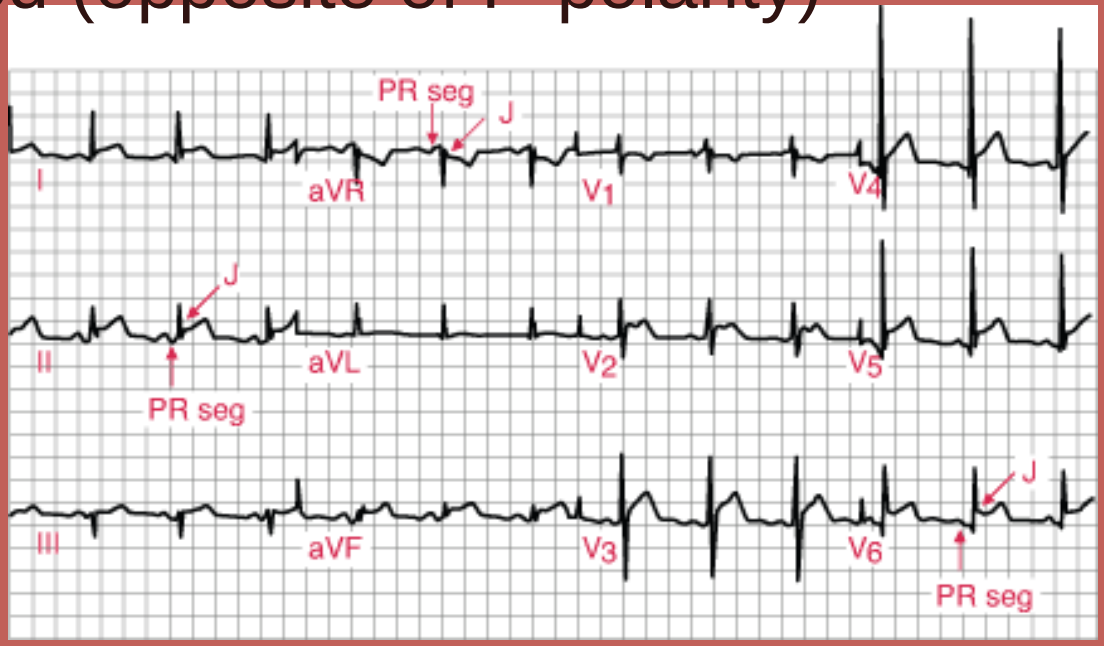


Pericardial effusion

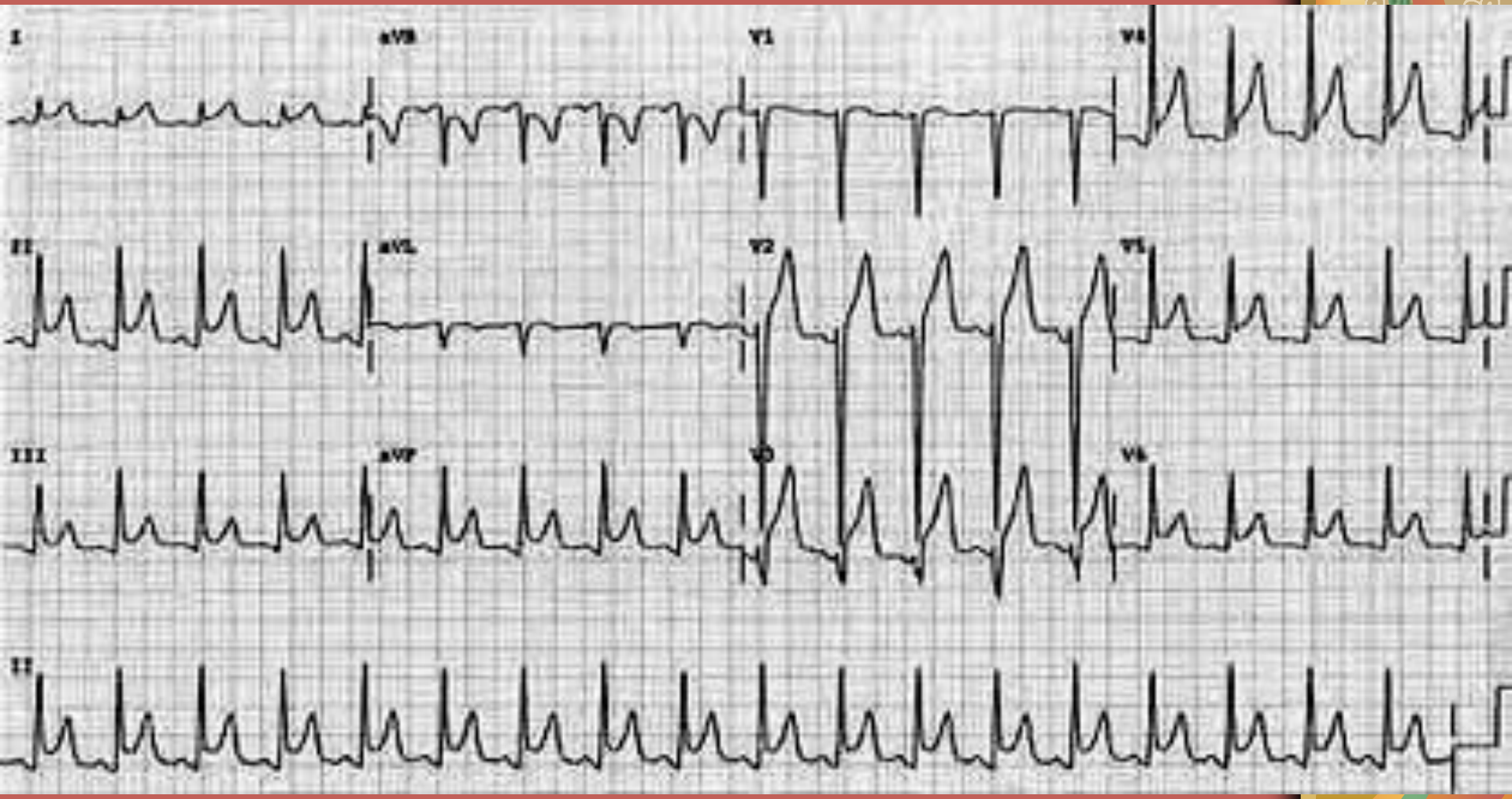
Constrictive Pericarditis

Pericarditis – EKG changes

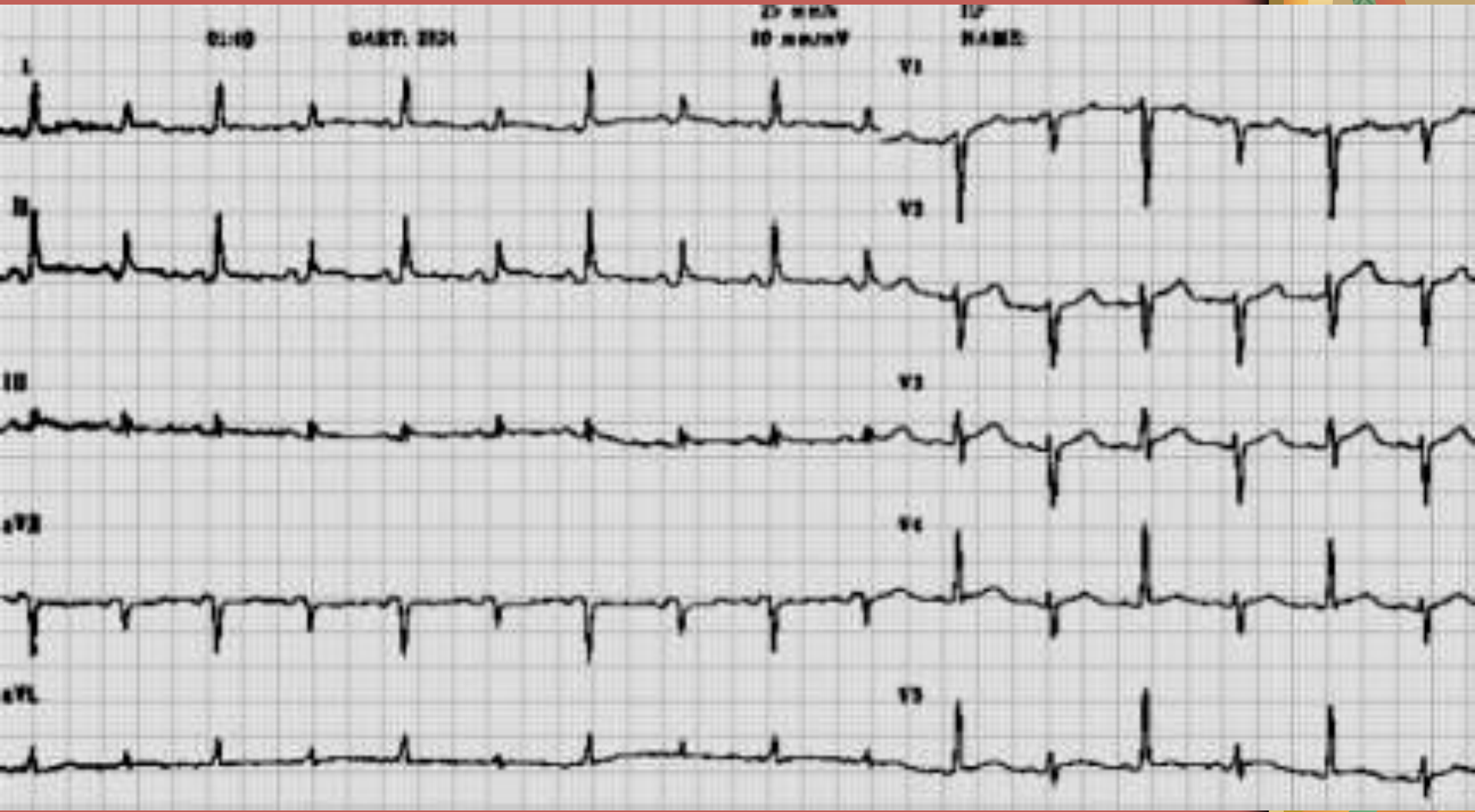
- Diffusely elevated J-ST segments
  - ST concave (saddle-shaped) & < 5mm
    - Best seen in I, II, V5, V6
  - ST in STEMI is convex (dome-shaped) & > 5mm elevation, localized in area
- PR deviated (opposite of P-polarity)



Pericarditis - EKG



Electrical Alternans

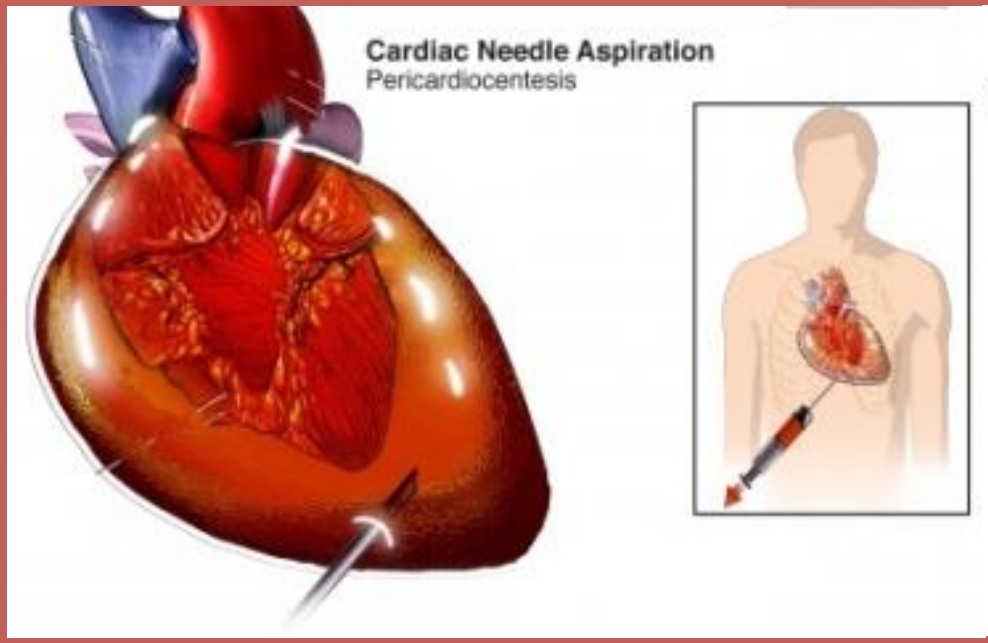


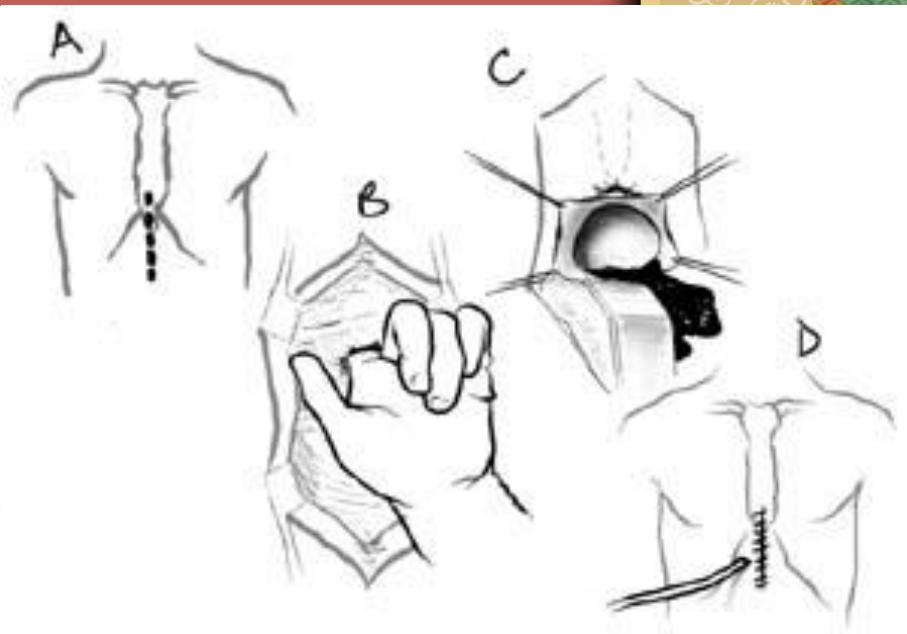
Pericarditis - Treatment

- Resolve underlying cause
- Rx to decrease inflammation
  - NSAIDs (ibuprofen 300-800 mg Q 6-8 hr
  - ASA
  - Colchicine 1-2 mg X1, then 0.5-1 mg QD
  - Steroids
    - if other treatments ineffective
    - risk of recurrent pericarditis after taper
- Limit activity
  - At least 3 months for athletes

Pericardial Effusion - Treatment

- Observe with serial Echo if small
- Pericardiocentesis
- Pericardial window if recurrent





Constrictive Pericarditis

- May be caused by:
  - acute pericarditis
  - Radiation
  - cardiac surgery or trauma
  - TB
- Presentation
  - Dyspnea
  - Edema, ascites
  - Elevated JVP
  - Pleural effusion
- Calcification seen on Echo, X-ray, CT or MRI in 30%
- Echo
  - ↑ R & L pressures
  - Tricuspid regurg
  - Abnormal septal motion
  - Impaired filling
- Treatment
  - Medication
  - Pericardectomy

Myocarditis

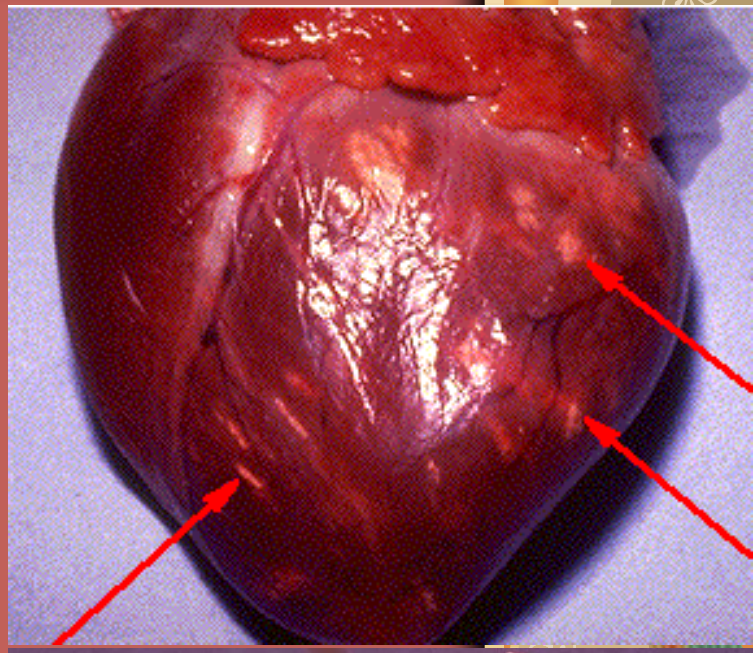
- Symptoms
  - Chest pain – 35%
  - CHF
  - Malaise
  - Syncope
  - Palpitations
  - Fever – 20%
- Fulminant myocarditis
  - Sudden onset of HF within 2-3 weeks of viral illness
  - presents with hemodynamic deterioration, cardiogenic shock

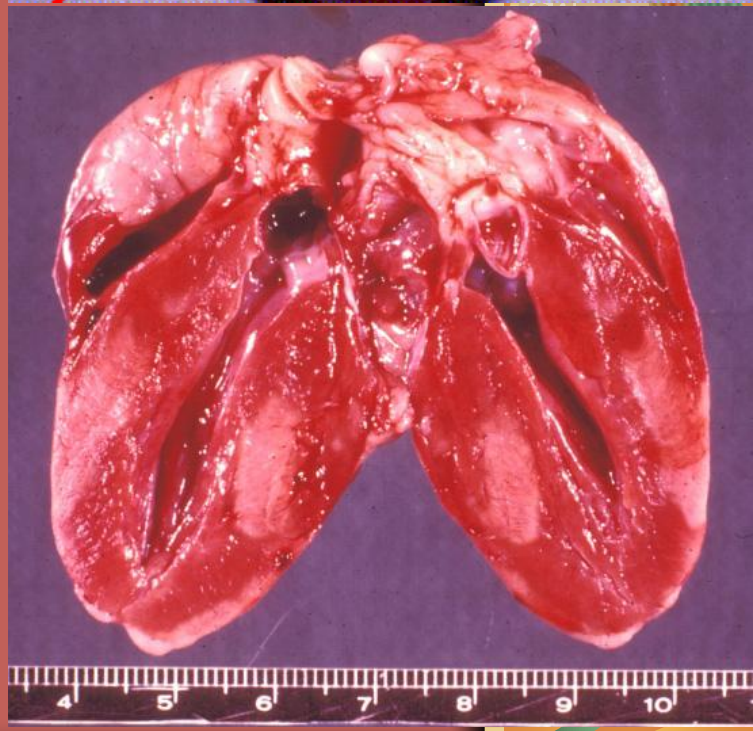
Myocarditis - Etiologies

- Viral
  - Coxsackie
  - Herpes
  - Parvo
  - CMV
  - Epstein-Barr
  - Hepatitis C
  - Other adenoviruses
  - Other endoviruses
- Lyme disease
- Bacterial
  - Strep, staph
  - diptheria
- Protozoic (ie Chagas)
- Paracytic
- Toxins
  - Hypersensitivities, as with antibiotics
  - Drugs from cocaine to acetaminophen
- Chemo- & cytokines
- Immunologic (SLE)

Myocarditis Pathophysiology

- Uptake of viral RNA causes cytotoxic necrosis
- Interstitial infiltrate
- Infiltration of mononuclear cells
- Killer cells target the myocardial cells expressing viral RNA and continue necrosis



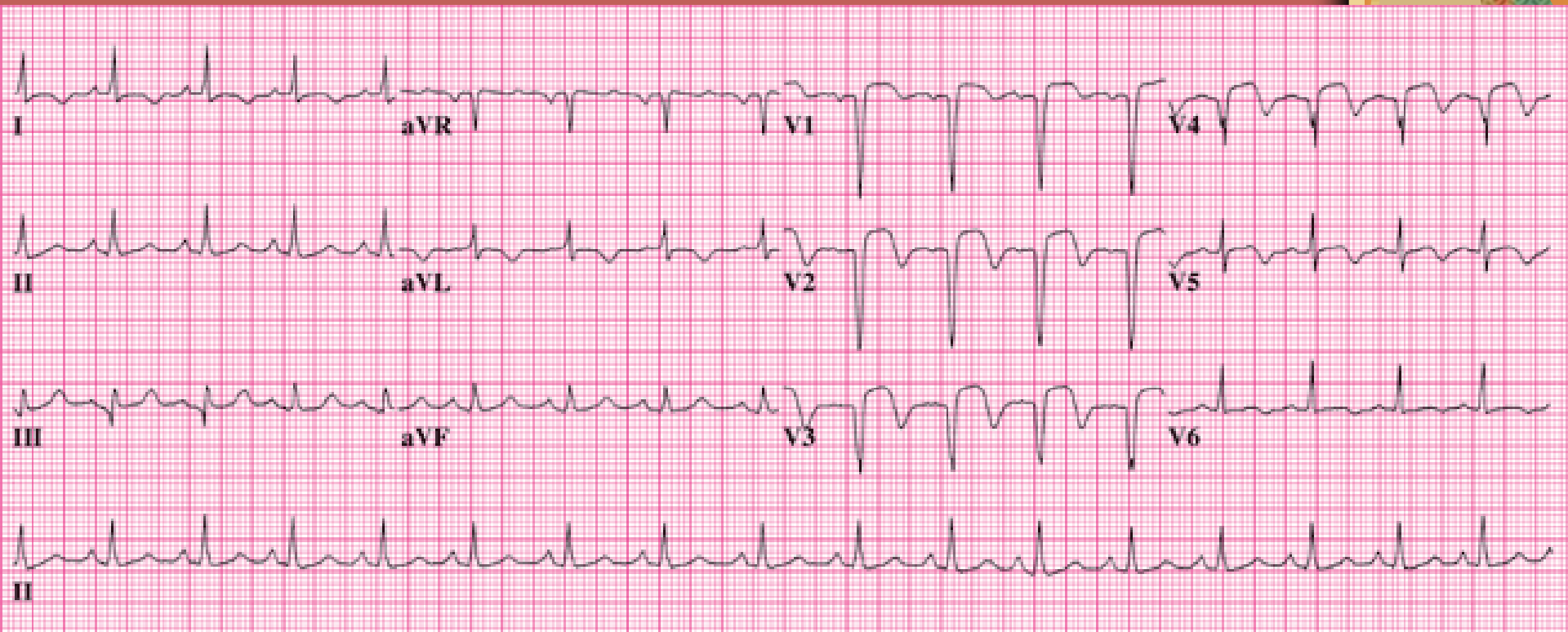


Myocarditis – Physical Findings

- Wide varibility
- Tachycardia out of proportion to fever
- Signs of CHF
- Mitral and tricuspid regurg from ventricular dilatation
- If inflammation diffuse, may also have pericarditis symptoms and rub

Myocarditis – EKG changes

- ST elevation – diffuse, no reciprocal changes
- Q waves
- AV and intraventricular conduction delays
- Tachydysrhythmias
- Low voltage

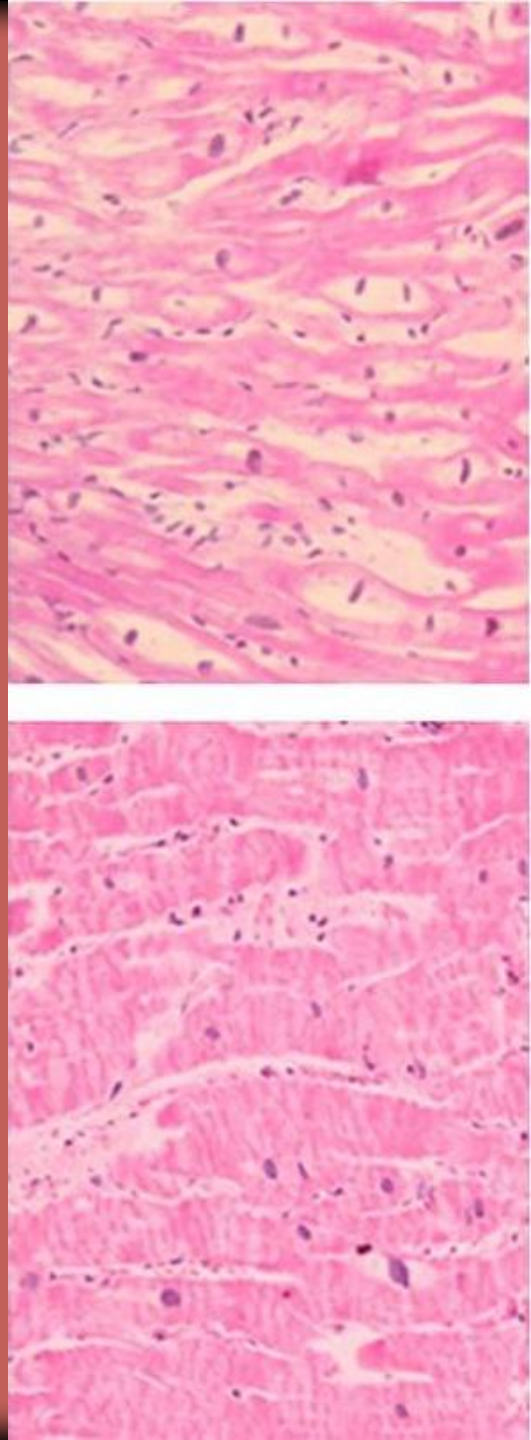


Myocarditis - Diagnosis

- ESR elevated – 60%
- Cardiac enzymes often negative
  - If elevated – slower rise and fall
- Leukocytosis – 25%
- CXR may be normal, or show CHF
- Due to presentation and EKG changes, often these patients are taken to cardiac cath, and found to have insignificant or no CAD

Myocarditis - Diagnosis

- Echo –
  - chamber dilatation or segmental wall motion abnormality along with a small pericardial effusion
  - Decreased EF
- MRI – tissue edema, capillary leakage
- Biopsy –
  - Inflammation with $\geq$14 lymphocytes & macrophages/mm^2
  - Allows identification of infective agent



Myocarditis - Treatment

- Supportive
  - CHF management
  - Rhythm management
  - Limit activity for 6 months
- Viral – immunoglobulin, anti-viral
- Giant cell – immunosupression
- Fulminant myocarditis
  - IABP as needed if cardiogenic shock
  - Ventricular assist device
- Severe acute myocarditis
  - Ventricular assist device
    - unloads ventricle, bridge to recovery

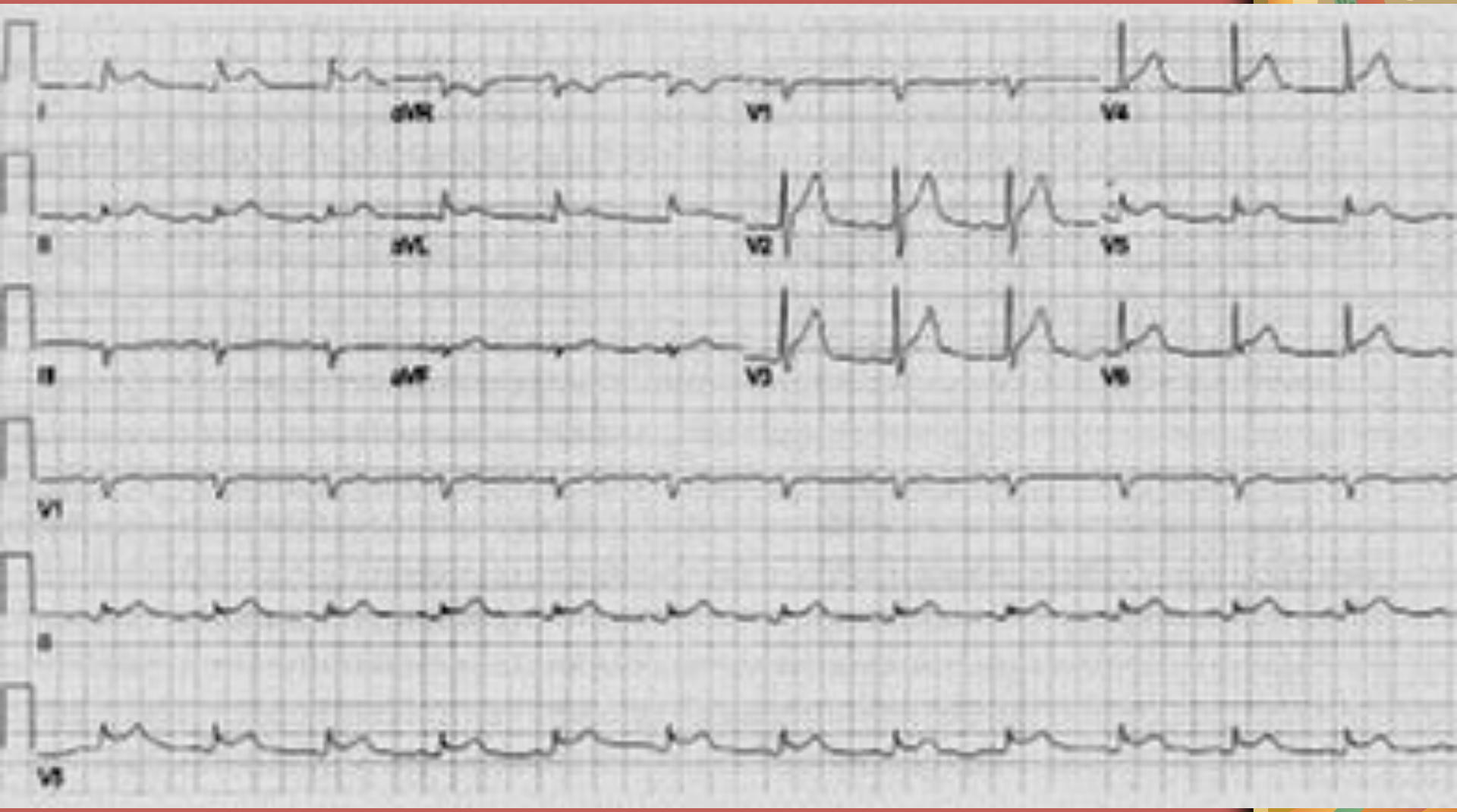
Myocarditis - Outcomes

- The amount of myocardial damage is variable
  - insignificant
  - extensive damage leading to dilated cardiomyopathy
- Some “idiopathic” cardiomyopathies are suspected to be due to recurrent, subclinical myocarditis

Remember KG?

- 42 year old man
- Presents with complaint of chest pain
- Pain has increased over last 2 hours
  - Heavy, aching
- Now rates it as 7/10
- BP 92/50
- Sinus Tachycardia, rate 116
- Temperature 101.4

KG



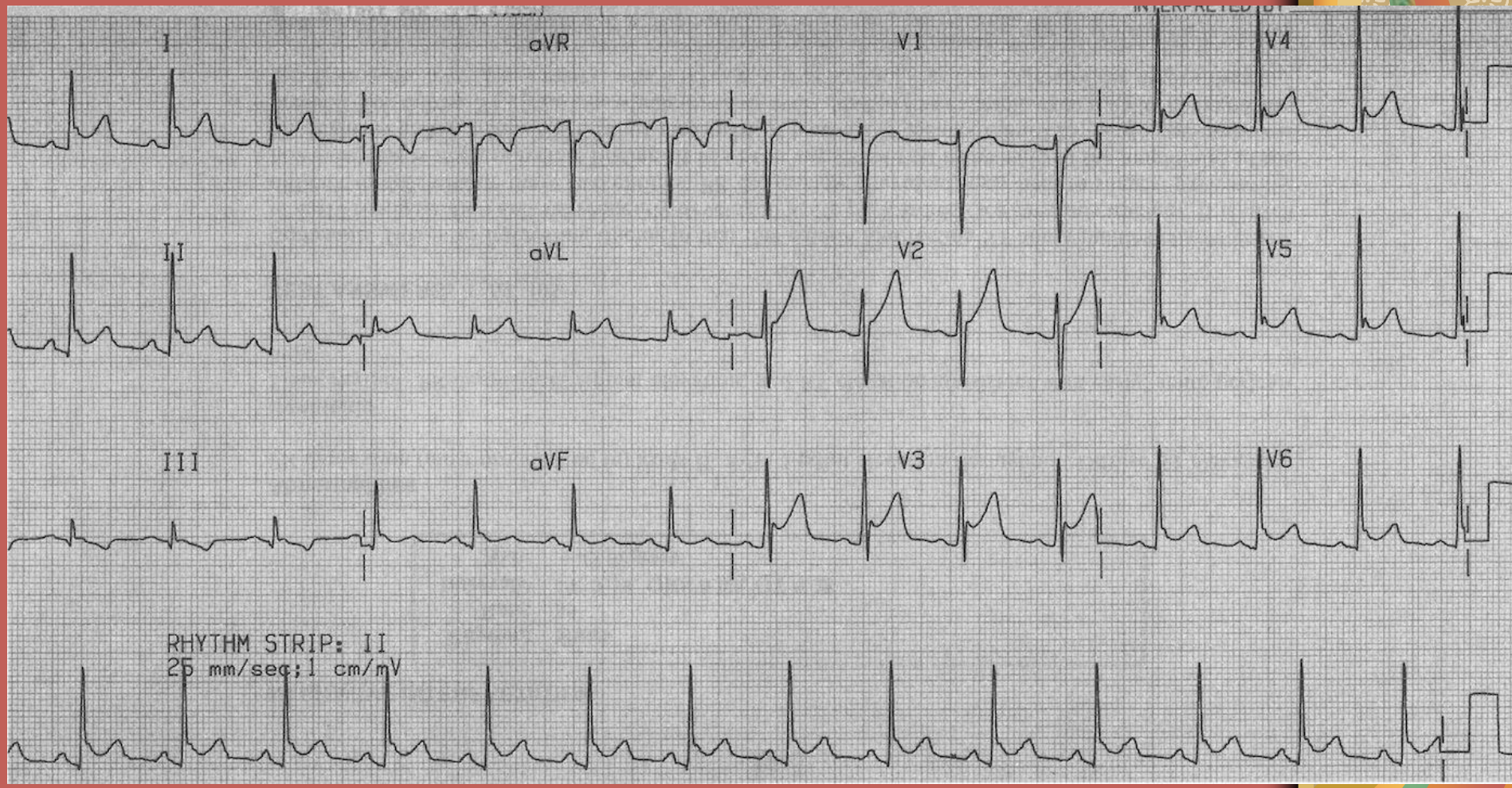
KG

- Recent upper respiratory infection
- Troponin 0.79
- CK-MB 8.2
- WBC ↑, ESR ↑
- Echo
  - segmental wall defects
  - EF 37%
  - LV dilitation
- CXR – pulmonary congestion, effusion

Case Study #2 - CE

- CE is a 54 year old woman
- Presents with complaint of chest pain
- Pain has been present for 3 hours
- No relief with antacids, acetaminophen
- Rates pain as 6/10
- BP 147/86
- Sinus rhythm, rate 96

CE


I
aVR
V1
V4
II
aVL
V2
V5
III
aVF
V3
V6
RHYTHM STRIP: II
25 mm/sec; 1 cm/mV

CE – What do you want to know?

- History
- Physical exam

CE – What tests? Diagnosis?

- Tests
- Diagnosis

CE – Treatment?

Thank you!

Mary.stahl@aacn.org